Newly Discovered Franklin Invention

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on
COLONIAL and CONTINENTAL CURRENCY

By

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Eric P. Newman, A.N.A. No. 4624

FOR an invention by Benjamin Franklin to be recognized first in 1963 is astonishing enough, since his accomplishments always have been carefully researched. For paper currency printing to have been the field in which Franklin's unrecognized invention was developed is more surprising, since the general public in the colonial era and numismatists ever since have had examples of Franklin's paper money readily available for study. For employment of an invention in printing to be confined virtually to paper money of early America is even stranger. Yet there is a sound reason for such a printing invention by Franklin to have been unrecognized and therefore unappreciated . . . Franklin intended it to be a numismatic secret.

Numismatists long have noticed leaves as the principal decoration on the reverse of many types of American colonial and Continental Currency.[1] These leaf reproductions are found on many of the pre-Revolutionary and Revolutionary paper money issues of Delaware, Maryland, New Jersey, Pennsylvania, and the Continental Congress, all of which will be considered in this monograph. Yet numismatic literature is devoid of information on the source or the reason for the continued use of the leaf illustrations. No botanical comment concerning the leaves has been found. It has been mentioned with respect to Continental Currency that leaf designs were used to make counterfeiting more difficult,[2] but no basis for that assertion has been promulgated which does not apply equally to any other complex design. The only hint that some unusual technique was used for leaf prints on currency was a wild speculation by W. A. Dwiggins in 1944 that Franklin pressed leaves into a wood block and printed the image from the intaglio with the leaf elements appearing white.[3] This was illogical and impossible but an inspired thought.

While preparing an exhibition of international floral art at the Philadelphia Museum of Art in the spring of 1963, the exhibition and catalog of which were entitled "A World of Flowers: Paintings and Prints," Whitfield J. Bell Jr., associate librarian of the American Philosophical Society, and former associate editor of *The Papers of Benjamin Franklin,* noted that leaf imprints were to be found on American colonial currency and in a 1737 booklet printed by Benjamin Franklin. Carl Zigrosser, the museum's curator of prints, and his associate, Kneeland McNulty, undertook an investigation of this unrecorded form of nature printing, their findings being published in the catalog of the exhibition.[4] The search to discover the actual method employed by Franklin continued, with the active help of Dr. Bell, and the author was encouraged by McNulty to undertake a broad numismatic and process study. Related botanical investigation was performed by George H. M. Lawrence and Willem Margadant, of the Hunt Botanical Library in Pittsburgh, and

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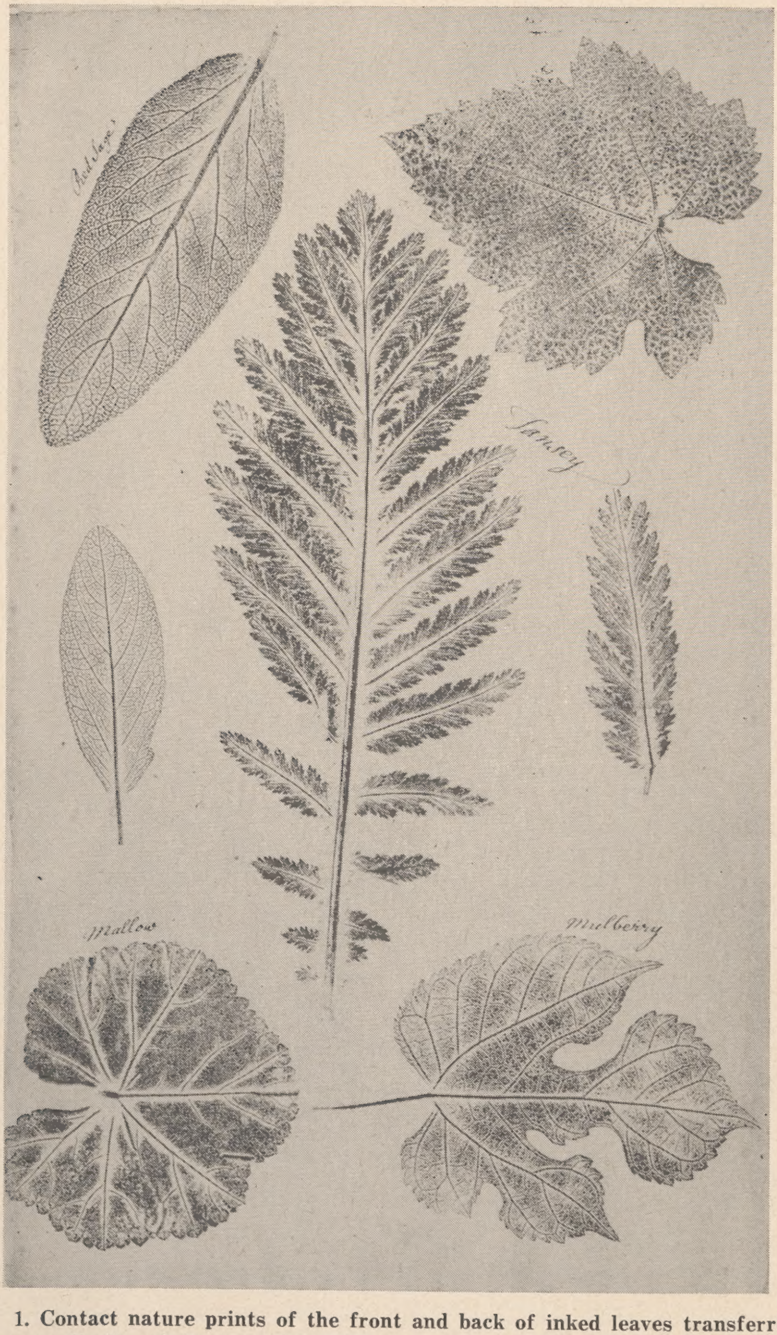
[1] Richard T. Hoober, "Franklin's Influence on Colonial and Continental Paper Money," *The Numismatist,* Vol. 69, No. 12 (Dec., 1956), pp. 1358, 1361; Kenneth Scott, *Counterfeiting in Colonial New York,* The American Numismatic Society Numismatic Notes and Monographs No. 127 (New York, 1953), pp. 73, 121.

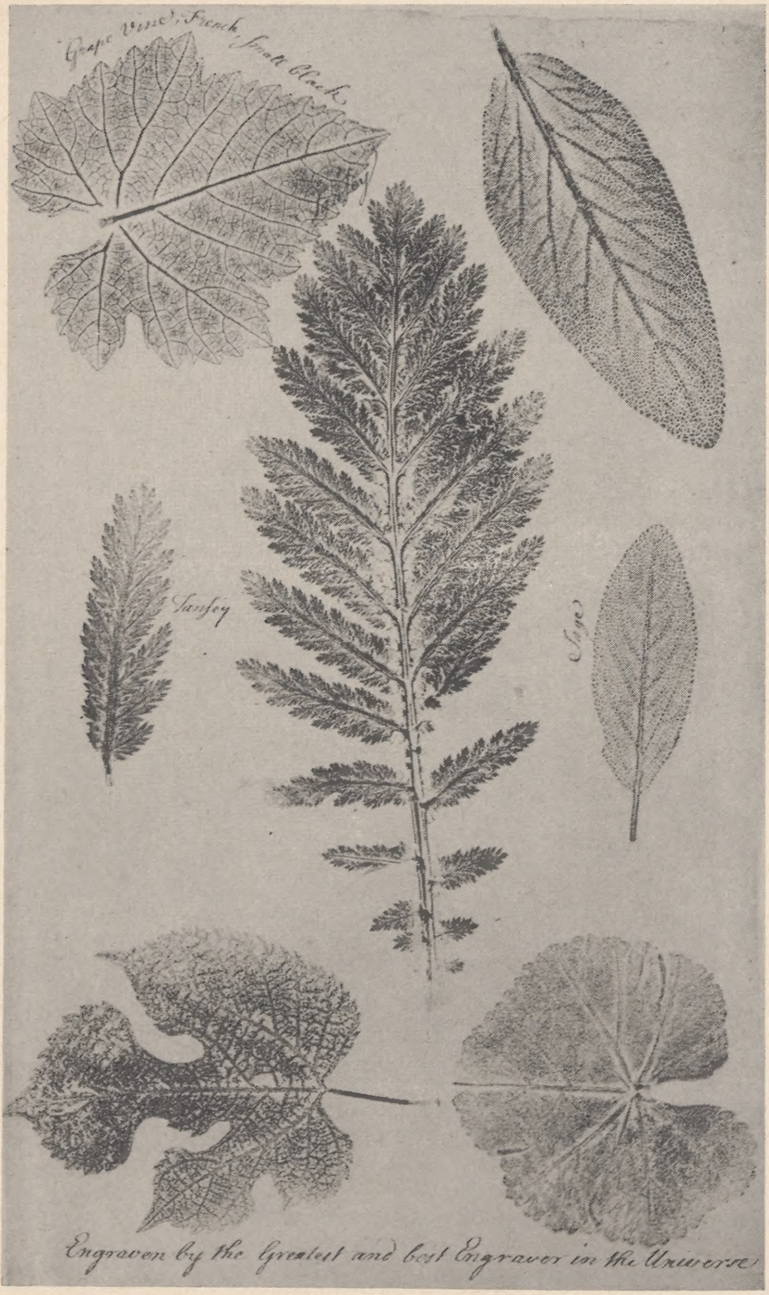
[2] Paul L. Ford, *The Many Sided Franklin* (New York, 1899), p. 324; Richard T. Hoober, "Franklin, the Money Printer," *Coin World,* Dec. 22, 1961, p. 22.

[3] W. A. Dwiggins, "Introduction," pp. xx-xxi to George L. McKay, *Early American Currency: Some Notes on the Development of Paper Money in the New England Colonies,* The American Numismatic Society Numismatic Notes and Monographs No. 104 (New York, 1944), and also Typophile Chap Books: X (New York, 1944).

[4] Exhibition at Philadelphia Museum of Art from May 2 to June 9, 1963, *A World of Flowers: Paintings and Prints,* Philadelphia Museum of Art Bulletin, Vol. LVIII, No. 277 (Spring, 1963), pp. 236-242.



1. Contact nature prints of the front and back of inked leaves transferred to paper by Joseph Breintnall in Philadelphia between 1731 and 1742 (Library Company of Philadelphia Collection).


Grape vine, French, Small Black
Tansey
Sage
Engraven by the Greatest and best Engraver in the Universe

The illustrations on this and the previous page constitute a single sheet of paper which was folded vertically so that the leaves were pressed between the inside of the fold.

by the late Robert E. Woodson Jr., of Washington University in St. Louis. Edwin Wolf II, of the Library Company of Philadelphia, called attention to unpublished historical material. C. William Miller of Temple University, Elston G. Bradfield, editor of *The Numismatist,* and my son, Andrew E. Newman, made valuable suggestions to clarify and improve the text. Harley L. Freeman, Charles Wormser, John J. Ford Jr., Richard T. Hoober, American Antiquarian Society, and others made currency available for study. The author sincerely appreciates the coöperation of these persons and organizations.

Nature Printing

Nature printing is the reproduction of an identical image of an object of nature, directly from the object itself. Children at school undertake such work in its simplest form by applying ink to one or both surfaces of a leaf and pressing a piece of paper against the leaf by hand or with an instrument such as a roller. The ink transfers from the stem, veins, and other high portions of the leaf, leaving a mirror image. Both sides may be readily reproduced at one time. This type of nature printing was known to Leonardo da Vinci, an illustration of a sage leaf being included and the process explained in *Codex Atlanticus* (1490-1505).[5] Improvement in the technique of such printing enabled J. H. Kniphof in 1733 to use nature printing for botanical books, but each successive print from a plant or leaf deteriorated in quality until a new specimen had to be substituted. Since only a few books were to be produced, the process served its purpose but was not satisfactory for production printing.[6]

It was stated by the great Swedish botanist, Carl Linnaeus, in *Philosophia Botanica* (1751) that a man named Hesselius made leaf prints in America in 1707. Peter Kalm, a friend of both men, seems to have been the source of the information. However, the artist, Gustav Hesselius did not arrive in Delaware until 1711 and the erroneous 1707 date must have resulted from a scrivener's error. Although no botanical nature printing by Hesselius is known, an example of such work by Francis Daniel Pastorius, who died in Philadelphia in 1719, does exist in the collection of the Library Company of Philadelphia and lends support to the general import of the comment by Linnaeus. Not long afterward, Joseph Breintnall, a Philadelphia friend of Franklin, undertook to make and sell nature prints of botanical specimens for scientific purposes. He obtained examples from the garden of John Bartram and elsewhere. By 1733 he listed prints of 127 species for sale. He kept examples of his prints in specimen books bearing dates from 1731 through 1742 and gave God credit for the designs by a cleverly written notation, "Engraven by the Greatest and best Engraver in the Universe." (Illustration No. 1). These books contain ink prints of feathers and woven cloth as well as those of leaves and plants.[7] His prints were valued highly, as indicated by an advertisement in *The Pennsylvania Gazette* (Franklin's newspaper) for April 26, 1733, offering a reward for a lost "Sheet and a half of Prints of Leaves, being part of a compleat Set."

Paper Currency Printing Methods

The various methods of printing paper currency in America beginning in 1690, require analysis in order to appreciate Franklin's contribution of nature printing to the development of the printing art. Some early American paper currency was engraved on copper, the text and the ornamentation being cut by hand into the metal plate. One plate often contained several different denominations. Ink was applied to the intaglio plate, the surface wiped clean, and the paper pressed against the plate.

Other early American paper currency was printed in relief from a combination of type, ornaments, and pictorials. Individual printing type and type size ornaments were imported from Europe. These were produced by being cast in metal molds. Decorative borders, insignia, nonstandard ornaments, and pictorials were produced in America by engraving the design into metal, from which multiple castings could be made, or produced directly as woodcuts or original metal blocks. All of the elements were assembled and squeezed tight with wood furniture and locked into a printer's chase. Ink applied directly to the surface of such a form made the printing process simpler and more uniform than printing from an intaglio plate.

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[5] Manuscript in the Ambrosiana Library, Milan, Italy, Fol. 72; reproduced in Philadelphia Museum of Art Bulletin, Vol. LVIII, No. 277 (Spring, 1963), p. 236.

[6] Catalogue of Botanical Books in the Collection of Rachel McMasters Hunt (Pittsburgh, 1961), Vol. II, Part II, p. 216; Ernst Wilhelm Martins, Neueste Anweisung Pflanzen nach dem Leben Abzudruken (Weztar, Germany, 1785).

[7] Collection of the Library Company of Philadelphia.

Some colonies changed from intaglio printing to printing in relief; others used only printing in relief, and still others used both. During the American Revolution, printing in relief was the most commonly employed method for producing paper money.

Franklin gained experience in casting type, ornaments, and insignia, as soon as he returned from England to Philadelphia on October 11, 1726. He "had seen types cast at James's in London."[8] He might have known of experiments by William Ged, a Scotch gunsmith, who proposed that an entire page of text might be printed from one solid type metal casting.[9] This was accomplished by making a plaster negative from a form composed of set type, and then pouring type metal into the plaster mold to cast a stereotype. This experiment was abandoned in England in 1730 as impractical, but was the forerunner of stereotyping.

Franklin was aware that colonial paper money, whether printed in relief or from intaglio plates, had been extensively and cleverly counterfeited. Shortly after Franklin had been discharged from Samuel Keimer's printing shop in Philadelphia, the printing of New Jersey paper money pursuant to the law passed February 10, 1728, was open for contract. Keimer knew Franklin's skill was needed and was afraid that Andrew Bradford, the other Philadelphia printer (son of William Bradford, the first printer in New York, who printed the early New York currency) would obtain the contract by hiring Franklin. Keimer re-employed Franklin, obtained the contract, and left Franklin in Burlington, New Jersey, to do the work. This was Franklin's first experience in printing currency. For this work Franklin built "a copper-plate press," which apparently was designed both to print in relief from a form of composed type, ornaments, and insignia, as well as to print from an engraved copper plate.[8] Thereafter he printed New Jersey currency through the July 2, 1746, issue.

In 1728, James Franklin, brother of Benjamin, petitioned the Rhode Island assembly to urge that Rhode Island authorize its currency to be printed in relief from ornaments, etc., cast from engraved models instead of being engraved in intaglio on copper plates[10]. The petition pointed out that ink from an intaglio plate lies on the surface of the paper and the denomination or design can be altered by pen, whereas printing in relief from type and ornaments lies in a self-made depression in the paper and is much more difficult to alter well; that the engraved plate bills varied from heavy inking to light inking with some details often not being distinct, whereas printing in relief from type would routinely show full detail and be constant in depth of color; that an engraved plate could not be made as a deceptive counterfeit for a bill printed in relief because the area around the letters had to be cut away; that printing in relief is cheaper than printing from engraved plates; and that negatives and castings of specially cut flowers and ornaments can be retained exclusively by the government so that no new ones could be cast without approval. His arguments were sound, but in spite of a history of extensive counterfeiting and alteration of its engraved currency, Rhode Island rejected his suggestions.

Benjamin Franklin's support of the desirability of the general use of paper currency in America took the form of an anonymous pamphlet, printed on April 3, 1729 and entitled "A Modest Inquiry into the Nature and Necessity of a Paper Currency." Because of its convincing effect on the public and on public officials, the Pennsylvania assembly passed an act on May 10, 1729, for further currency to be issued.

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[8] Benjamin Franklin, *Autobiography* (various editions), relating to events in the years 1728-29.

[9] Article on Printing, *Encyclopaedia Britannica*.

[10] Archives in the Office of the Secretary of State in Providence, Petitions, Vol. I, p. 25; Elisha R. Potter and Sidney S. Rider, *Some Account of the Bills of Credit or Paper Money of Rhode Island* (Providence, 1880), p. 44n; Kenneth Scott, "James Franklin on Counterfeiting," *American Numismatic Society Museum Notes VIII* (New York, 1958), p. 217; George L. McKay, *Early American Currency,* American Numismatic Society Numismatic Notes and Monographs No. 104 (New York, 1944), p. 60.

Pursuant to the act, currency dated September 15, 1729, was printed by Andrew Bradford, although Franklin erroneously claimed that he received the printing contract. Actually, Franklin received his first Pennsylvania currency printing contract for the issue authorized under the act of February 6, 1731.[11] Either alone, or with David Hall as a partner from 1748 on, Franklin continued as the printer of Pennsylvania paper money through the issue of June 18, 1764. Thereafter, Hall and Sellers, a successor to the Franklin partnership, continued the printing of Pennsylvania currency through 1776.

In 1729 Franklin became the printer of the Delaware paper currency, and either alone or with David Hall as a partner, continued that work for Delaware through the issue of May 31, 1760.

Attribution to Franklin

A nature print of a leaf of the rattlesnake herb was included by Franklin in *Poor Richard's Almanac* for 1737 (Illustration No. 2).

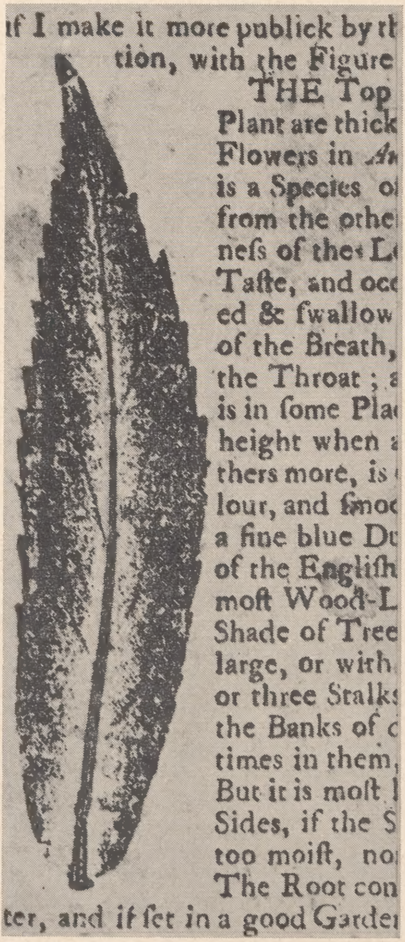
The first appearance of nature prints on colonial currency is found on the August 10, 1739, Pennsylvania issue "Printed by B. Franklin" (Illustration No. 3). These consist of three blackberry leaves on a sprig and a willow leaf with its stipules. There is no background. A separate cut from the identical negative is found on each known denomination of the issue, although the direction in which the cut faces on the notes varies.

In Delaware notes, leaf prints first appear on the issue of February 28, 1746, and bear Franklin's imprint. Each denomination has different leaf prints.

In New Jersey notes, leaf prints first appear on the issue of July 2, 1746, and on some denominations "Printed by B. Franklin" appears. These leaf prints are of a sage leaf and are identical on each denomination.

Because *Poor Richard's Almanac* of 1737 and the foregoing currency issues bearing nature prints were first printed by Franklin, he must have been the innovator of the method of printing nature reproductions.

Franklin realized that the most effective way to deter counterfeiters was to force them to engrave a plate for a note printed from type from various fonts, as well as ornaments and pictorials. Counterfeiting by this method was difficult, and the results easy to detect. If a counterfeiter could obtain the various elements for printing in relief, his products would be more deceptive. Even if the counterfeiter could obtain from other



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2. Leaf of Rattlesnake herb from *Poor Richard's Almanac* for 1737, earliest example of Franklin's nature printing. (American Philosophical Society)

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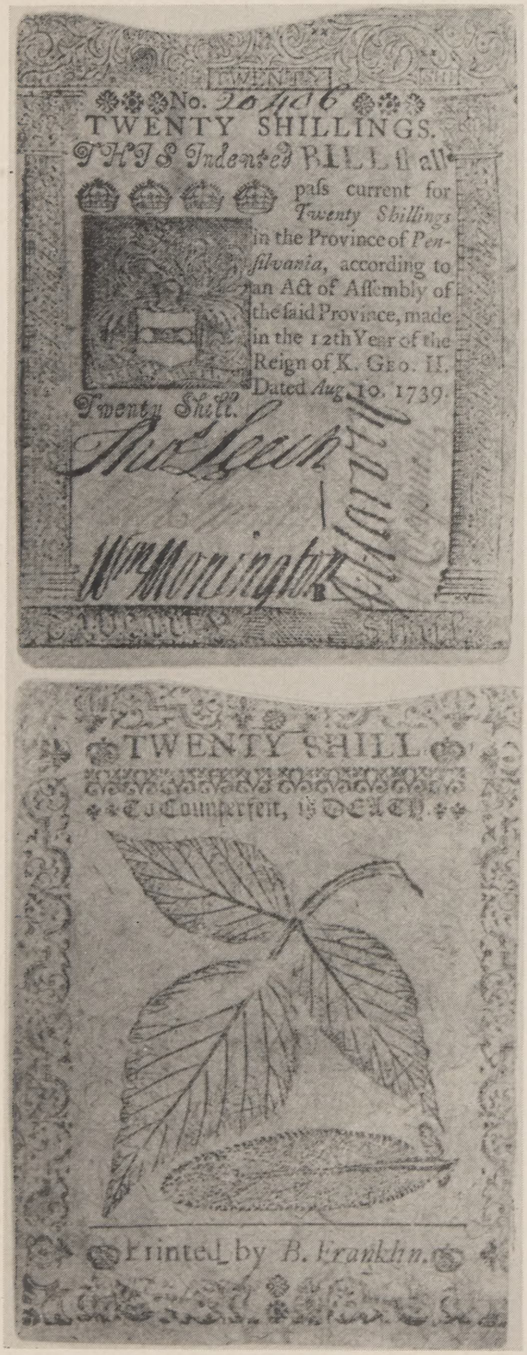
[11] Leonard W. Labaree, Editor, *The Papers of Benjamin Franklin* (New Haven, 1959), Vol. 1, pp. 141, 174.



TWENTY

No. [illegible]

TWENTY SHILLINGS.

THIS Indented BILL ſhall paſs current for *Twenty Shillings* in the Province of *Penſilvania*, according to an Act of Aſſembly of the ſaid Province, made in the 12th Year of the Reign of K. GEO. II. Dated *Aug.* 10. 1739.

Twenty Shill.

Thos Leech

Wm Monington

TWENTY SHILL

To Counterfeit, is DEATH.

Printed by *B. Franklin.*

3. Face and back of 1739 Pennsylvania 20 shilling note being first currency prepared by Franklin's nature printing process.

sources the same type fonts used on genuine notes, the pictorials and the specially cut ornaments were not obtainable. Franklin cut some ornaments himself for this reason.[8] If the detail of a pictorial was exceedingly difficult, then a counterfeiter would tend to select some easier work, but what one engraver could do another could copy fairly well. Franklin must have realized from Breintnall's leaf prints and otherwise that leaves not only had exceedingly complex detail but also that their internal lines were graduated in thickness. This would make virtually impossible a fine reproduction by engraving. If, therefore, Franklin could keep his nature printing process concealed, he would have a very effective weapon against counterfeiting.

Untangling the Technique

A close examination of leaf prints on colonial and Continental Currency discloses a perfection of detail which indicates that it is not the result of hand engraving by an artist or craftsman. The position and graduated thickness of every vein and segment on each leaf is perfectly natural. Photography, electrometallurgy, and chemical etching, by which such reproduction might be accomplished today, had not been developed in the eighteenth century. A three dimensional effect is particularly evident in those leaf prints which have a background of woven fabric, there often being a thin white area surrounding the intricate perimeter of the leaf and the sides of the veins. In some cases the fabric detail actually shows through the leaf itself (Illustrations Nos. 4 and 15). A botanical analysis of the many varieties of leaves on the currency indicates no evidence of "artistic license." Some leaf specimens are shown in a transitional stage of growth, not having attained their mature shape. Portions of a leaf sometimes are used because there is insufficient space for the whole leaf. Each leaf, like a fingerprint, has characteristics of its own, differing from every other leaf, whether on the same plant or of the same species. It is evident that actual leaves and actual cloth were used to produce the printed image.

Thousands of impressions were required of each denomination of each paper money issue, and it is surprising to find that the identical leaf print often was used on the same denomination of a colony's issues even though printed many years apart. The leaf prints were as uniform in depth of color and in clarity as the printing of the type and borders. Although there are many clues leading to the conclusion that the printing was done from type metal castings, the leaf prints on the reverse of the 10 shilling Pennsylvania notes seem to offer the most convincing evidence that actual leaves and cloth were the basis for the design, and that multiple images could be produced from them.

All 10 shilling Pennsylvania paper money issues from January 1, 1756, through April 25, 1776, except October 1, 1773, have a birch leaf print on the reverse. There are two small white dots, one at the lower left and one at the upper right, of each such leaf print, indicating that the print was produced from a metal cut[12] nailed onto a wooden block. The upper right corner of about half of these rectangular leaf prints is missing, making it obvious that part of the cut accidentally had been broken off, the break being through the nail hole. This broken corner cut appears to have been used first on the January 1, 1756 Pennsylvania issue, and is evident on twelve subsequent issues ending with April 25, 1776, excluding that of October 25, 1775. Similarly identical leaf prints without a broken corner are found on the same issues including October 25, 1775, but excluding March 10, 1769 (Illustrations Nos. 5, 6 and 7).

The leaf, the leaf position, and the wavy sweep of the threads in the

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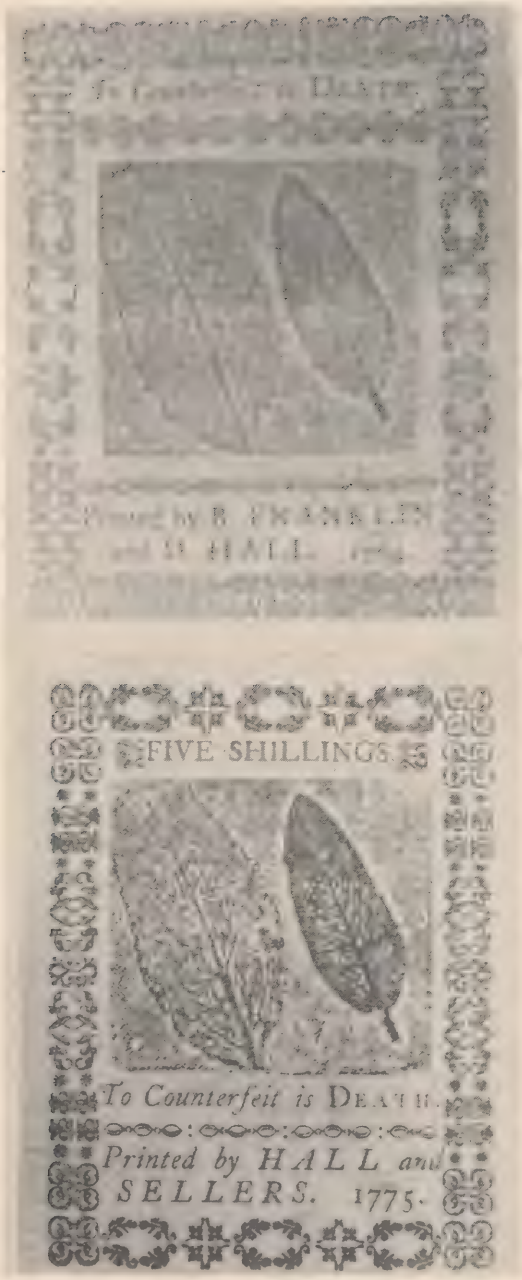
[12] The word cut as used in this monograph means the printing block from the inked surface of which the pictorial portion of eighteenth century American paper money was printed. The method by which the cut was produced should not be inferred from the fact that the original meaning of the word cut was based upon a cutting or engraving, as in a woodcut or an engraved metal plate. Even if a cut was a cast cut it may have been made either from a mold which had been prepared by an artist's cutting or engraving or from a mold made from a natural or man made object. A cut may have been either solid metal, metal mounted on wood, or wood, but physically was independent of the type and other elements with which it may have been locked up in a printer's form or makeup and never was part of an engraved plate containing other text or pictorials.



4. Typical identical nature prints on backs of 1756-75 Pennsylvania 5 shilling notes with denomination V, and by 1771, VS engraved into cast cuts.

cloth background are identical on the unbroken cut and the broken cut. On each cut there are three horizontal threads missing at the top of the cloth. On each issue date when both the unbroken and the broken cuts are used, there is a plate letter designation, either A or B, on the front. When the A plate letter is found with the broken corner leaf cut on the reverse, then the B plate letter is found combined with the unbroken corner reverse, and vice versa. An examination of an uncut sheet of notes confirms that the printing of both the A and B plate letter 10 shilling notes, along with other denominations, was simultaneous and that the two originally identical leaf cuts were used, one for each impression of the two 10 shilling reverses printed simultaneously. Since the leaf images remain constant from issue to issue, and the accompanying text and date on the reverse are changed for each issue, it is clear that the leaf design portion is an independent cut locked into a form along with type and ornaments. In the exceptions noted in the March 10, 1769 and October 25, 1775 issues, only one 10 shilling note was printed in the sheet, and this is confirmed by the lack of a plate letter on the front of every 10 shilling note of those issues. In the 1769 issue only the broken corner cut was used and in the 1775 issue only the unbroken corner cut was used.

Another basis for comparison between the unbroken and broken corner cuts is the inclusion of the denomination in white within the leaf cut. In the issues of January 1, 1756, October 1, 1756, and March 10, 1757, a thin and crude X represents the denomination (Illustration No. 5). In the six issues of 10 shilling notes in the period from July 1, 1757, through March 10, 1769, the X has been thickened. In the March 1, 1769 issue these leaf prints are found on the reverse of both the A and B plate letter varieties of the 60 shilling (3 pound) issue, but on these notes an L and S straddle the former X, making LX•S (60 shillings) and in the upper right corner L3 (for 3 pounds) is added (Illustration No. 6). Curiously, the 10 shilling note of March 10, 1769, appears to have been printed before the 60 shilling of March 1, 1769, because the identical leaf prints used on the latter were altered for the issue with the earlier date. Subsequently, in the five issues from March 20, 1771, through April 25, 1776, with leaf designs, the L in LX•S is obliterated and the L3 is filled in, when these same cuts again were used for 10 shilling notes (Illustration No. 7).

On the broken corner prints the top of the X slopes decidedly down to the right in every issue, but on the unbroken corner prints it is the bottom of the X which slopes decidedly down to the right in every issue. The change of the X to LX•S and then to X•S on both reverse cuts, as well as the differences between them, show that these denominational identifications were added and altered after the cuts had been cast from one original mold. The denomination obviously was sunk by hand into the reverse cut because, when printed, these numerals do not take ink and hence appear as white letters on the cloth design.

The following conclusions therefore can be drawn:

1. The leaf and cloth design are identical on all broken corner cuts and all unbroken corner cuts, and a means must have been used to make multiple cuts from one original leaf and cloth model.

2. Only two cuts from the original leaf and cloth model were made in this instance, and these were used and re-used from 1756 to 1776 without substitution, as the broken corner cut clearly indicates.

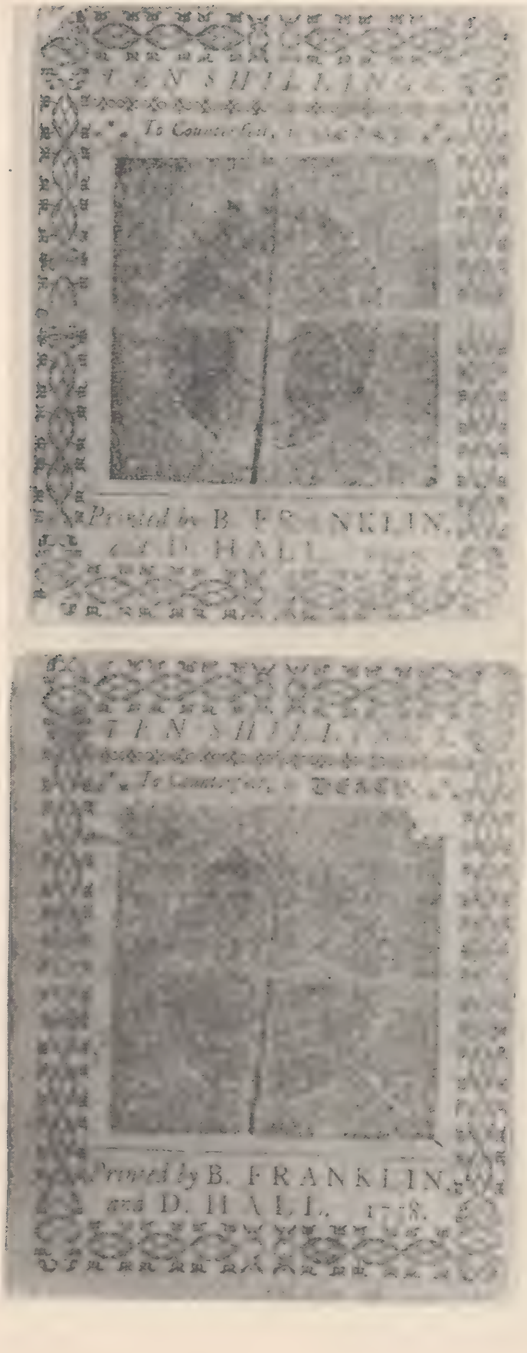
3. The addition of, and the alterations to, the denomination on the cuts also shows that the cuts were used and re-used and that new identical cuts were not available in this instance, for the mold must have broken after the two original cuts were made.

4. The denominations and their alterations have distinguishing characteristics on each of the two leaf cuts and further confirm that only two leaf cuts of this design were in use.

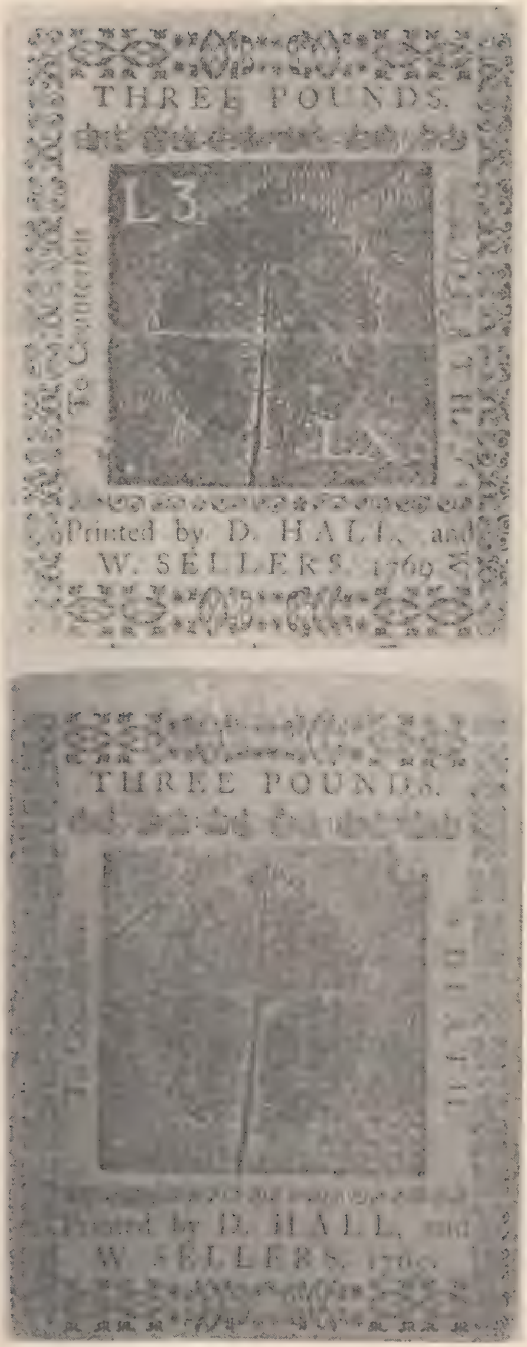
The Process

If anyone had left a record of how to make a printing cut from a leaf, it would not be necessary to reconstruct the process in the light of early eighteenth century knowledge. Apparently there are no other examples of printing from such cuts except on American eighteenth century paper currency and in *Poor Richard's Almanac* for 1737.

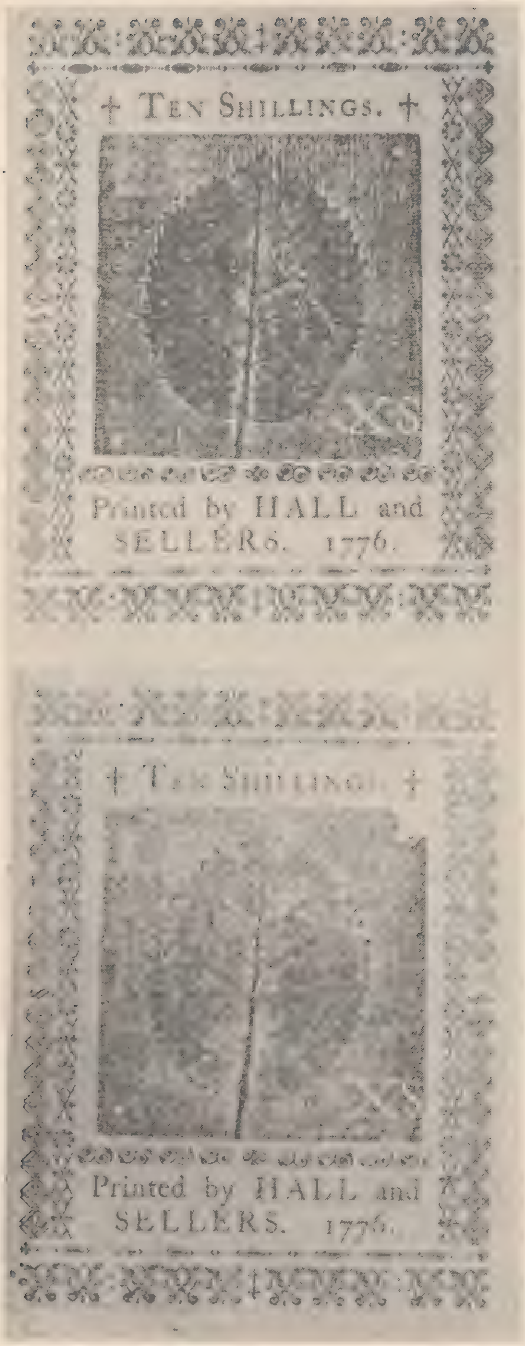
It seems that the process came close to being disclosed in a letter dated December 3, 1743, from Cadwallader Colden, of Philadelphia, to William



5. Typical identical unbroken corner and broken corner cut imprints on backs of 1756-69 Pennsylvania 10 shilling notes with denomination X engraved into cuts. (Compare with Nos. 6 and 7)



6. Identical unbroken corner and broken corner cut imprints on backs of March 1, 1769 Pennsylvania 3 pound notes with denomination modified to LXS and with L3 added. (Compare with Nos. 5 and 7)


Ten Shillings.
XS
Printed by HALL and SELLERS. 1776.
Ten Shillings.
XS
Printed by HALL and SELLERS. 1776.

7. Typical identical unbroken corner and broken corner cut imprints on backs of 1771-76 Pennsylvania 10 shilling notes with L3 removed from upper left and LXS modified to XS. (Compare with Nos. 5 and 6)

Strahan, a London printer. Colden indicated that he had met a printer who was "the most ingenious in his way without question of any in America" whom Strahan immediately knew was Franklin. Colden commented on a stereotype process of his own, relating to type, and then, referring to Franklin, wrote "he has done something on this foundation and which I have seen which has puzzled all the printers in this country to conceive by what method it was done. As printing is this mans trade and he makes a Benefite of it, I do not think my-self at liberty to communicate it without his consent. . . ."[13] Thus the secret was kept.

Since the high portions of the leaf and the cloth are printed in black, it required a double transfer to have the relief portion of a metal cut take the same position. Thus, some kind of negative casting of the leaf and cloth had to be produced, which not only would retain the detail but also become a mold to make a cut by casting. Fundamentally, the high portions of both the leaf and its background had to be on the same level to produce a cut which would print a flat uniform impression of both.

It seems logical to assume that the process was as follows:

Soft plaster was placed in a retainer and smoothed flat. Then a wet piece of textured fabric was laid on that surface. A moistened or fresh leaf then was laid onto the cloth, possibly with an adhesive or a film of plaster applied between them, so the leaf would adhere to the cloth after drying. A flat smooth board then was pressed against the top of the leaf and the exposed part of the cloth so that the leaf was forced down into the portion of the cloth underneath the leaf. In this way the veins and other high detail of the leaf and the threads of the exposed cloth were forced to take the same horizontal level. This unit was permitted to harden in that position.

To make a plaster negative of this unit merely required oiling the contact surface and applying a plaster mixture on top. The mixture probably overhung the side so that a lip around the negative would result. Finely ground asbestos or powdered brick, or both, might have been added to the plaster mixture to enable the plaster negative better to withstand the heat from molten type metal. Such a plaster mixture and use was recorded in Europe in 1740[14]. The plaster negative, when hard, then would become a mold into which melted type metal could be poured to make a cut. If the cut was withdrawn without harming the mold, additional cuts could be similarly cast, all of which would be identical. Thus, in the eighteenth century, with care and skill, a three-dimensional object of nature could be reproduced in detail upon one or more identical cuts for flat bed printing.

The use of the cloth as a background was unnecessary to the process, for the leaf could have been reproduced just as well while lying on a smooth plaster surface. A group of leaves could be and was used to make one negative, the limitation being the size of the cut desired. Sometimes only a portion of a leaf appears on a print, the balance of the leaf appearing to have been sliced off at the edge of the print. In these instances the whole leaf must have been used to make the casting, and the side was trimmed away to reduce the cut to the desired size. This adds further proof to the casting hypothesis, because an engraver would have fitted his work into the desired dimensions of the pictorial.

The cast cut could have initials, denominations, and other items engraved into it and these would appear white in the printed impression. When it became necessary to alter the denomination engraved into a cast leaf cut, it appears that the back of the cut may have been hammered forward in a small area in a manner similar to the way copper plate engraving is corrected. Whether the added crosshatching was produced by a small intaglio of crosshatching or otherwise is difficult to ascertain, but the alteration is so crude that the area of the removed insignia is quite evident (Illustration No. 7).

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[13] Jared Sparks, Editor, *The Works of Benjamin Franklin* (Boston, 1838), Vol. VI, pp. 18-24, 26, 29; Leonard W. Labaree, Editor, *The Papers of Benjamin Franklin* (New Haven, 1960), Vol. 2, pp. 386n, 387, 387n.

[14] Johann Michael Funk, *A Short but Useful Introduction to the Engraving of Plates on Blocks of Wood and Steel, for Making Letters, Ornaments and Other Figures and to the Art of Baking Plaster, of Preparing Sand Molds for Casting Letters, Vignettes, Tail Pieces, Medals and of Forming Matrices from Them.* (Erfurt, Germany, 1740), in German; George A. Kubler, Historical Treatises, Abstracts & Papers on Stereotyping (New York, 1936), p. 21.

Continental Currency Leaf Prints

When the Continental Congress authorized its first issue of currency on May 10, 1775, the printing was undertaken by Hall & Sellers of Philadelphia, successors to Franklin & Hall. There were four border cuts and one circular cut prepared for the front of each of the ten denominations except the $20 note, which had no border cuts. Since $48 was paid to David Rittenhouse for 36 "cutts,"[15] this must have been for all border cuts on the nine denominations and did not include any circular cuts. These border cuts and circular cuts were castings from engraved intaglios (Illustration No. 8).

Leaf cuts prepared from nature had given so much protection to Colonial issues that they were desired for the reverses of the Continental Currency. Apparently the time required to prepare a new set of leaf cuts was not available. Hall & Sellers thereupon must have gone through their accumulation of leaf cuts and selected many of those which had been prepared and used on Pennsylvania currency during Franklin's association with the firm. Some of these continued in use on Pennsylvania currency. These leaf cuts were used only on the eight lowest denominations, $1 through $8, but on the two highest denominations, $20 and $30, circular cuts were placed on the reverse.

A cut with one raspberry and two filbert leaves, having been used on the Pennsylvania 5 pound notes of April 25, 1759, and May 1, 1760, was selected for use on the $2 Continental note (Illustration No. 9) and subse-

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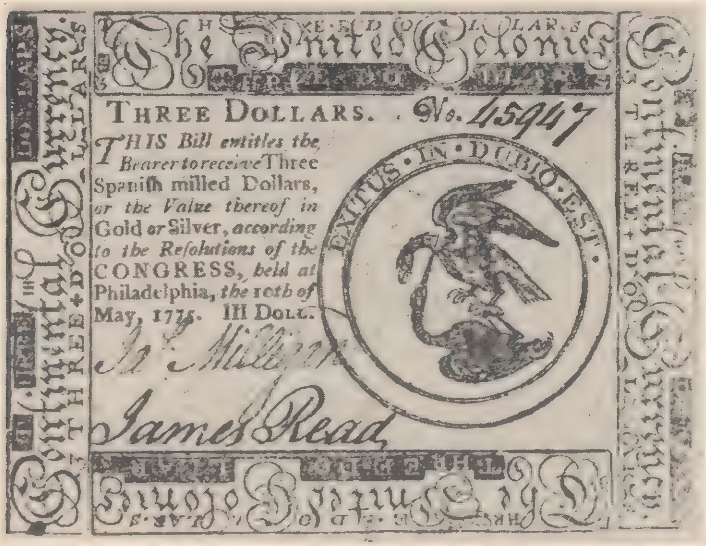
[15] *Journals* of the Continental Congress, Minutes of October 10, 1775.



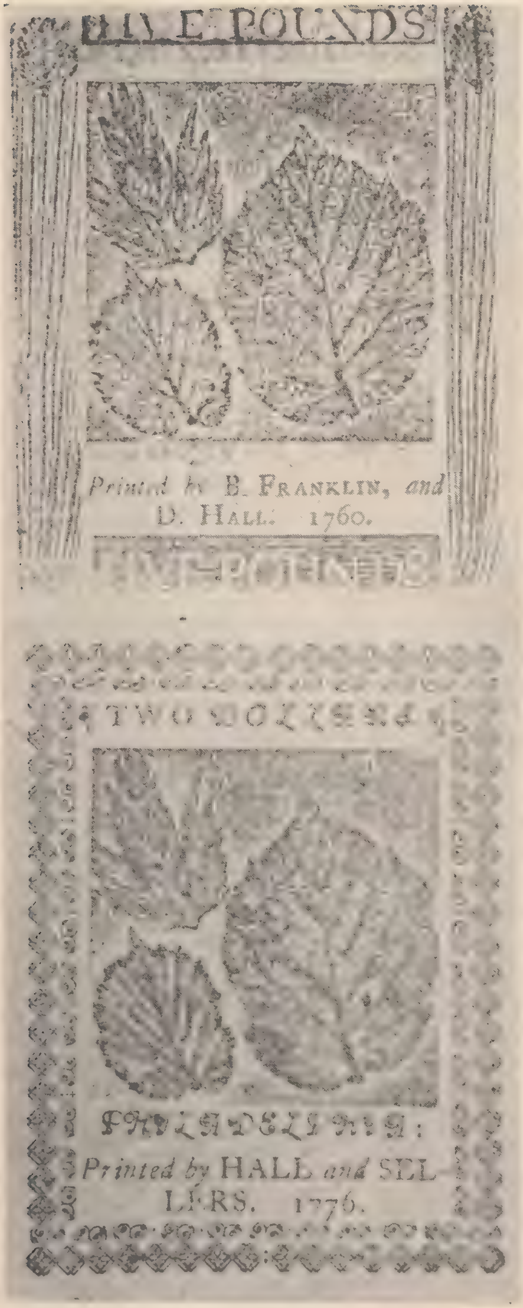
THREE DOLLARS. No. 45947

THIS Bill entitles the Bearer to receive Three Spaniſh milled Dollars, or the Value thereof in Gold or Silver, according to the Reſolutions of the CONGRESS, held at Philadelphia, the 10th of May, 1775. III Doll.

James Read

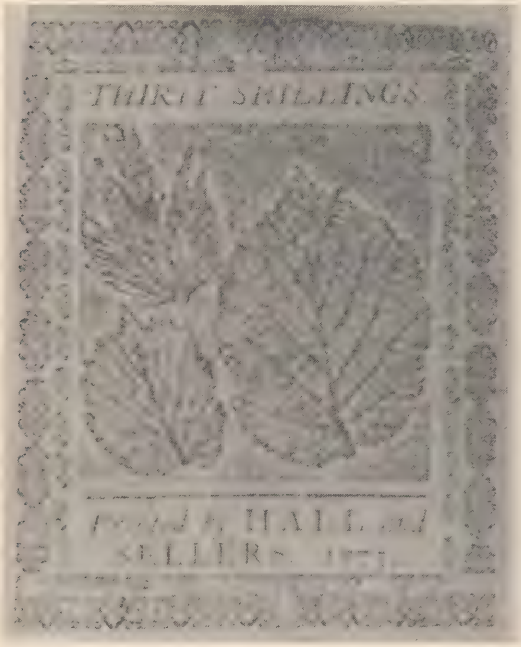
The United Colonies
Continental Currency
THREE DOLLARS
TUTUS IN DUBIO EST

8. Typical face of Continental Currency with four border cuts and one circular cut. For nature prints on the backs of Continental Currency see Nos. 9, 11, 12, 13, and 15.


FIVE POUNDS
Printed by B. FRANKLIN, and D. HALL. 1760.
TWO DOLLARS
PHILADELPHIA:
Printed by HALL and SELLERS. 1776.

9. Identical nature cuts on backs of 1759-60 Pennsylvania 5 pound notes and on 1775-77 Continental Currency 2 dollar notes. (Compare with No. 10)

quently was used on the July 20, 1775 Pennsylvania 30 shilling notes (Illustration No. 10). A cut showing skeletonized sections of elm leaves and maple fruits, having been used on the Pennsylvania 5 shilling notes of October 1, 1755, was inserted on the $3 Continental note (Illustration No. 11). A cut showing skeletonized wings of maple fruits, having been used on the Pennsylvania 10 shilling note of October 1, 1755, was selected for the $4 Continental note (Illustration No. 12).

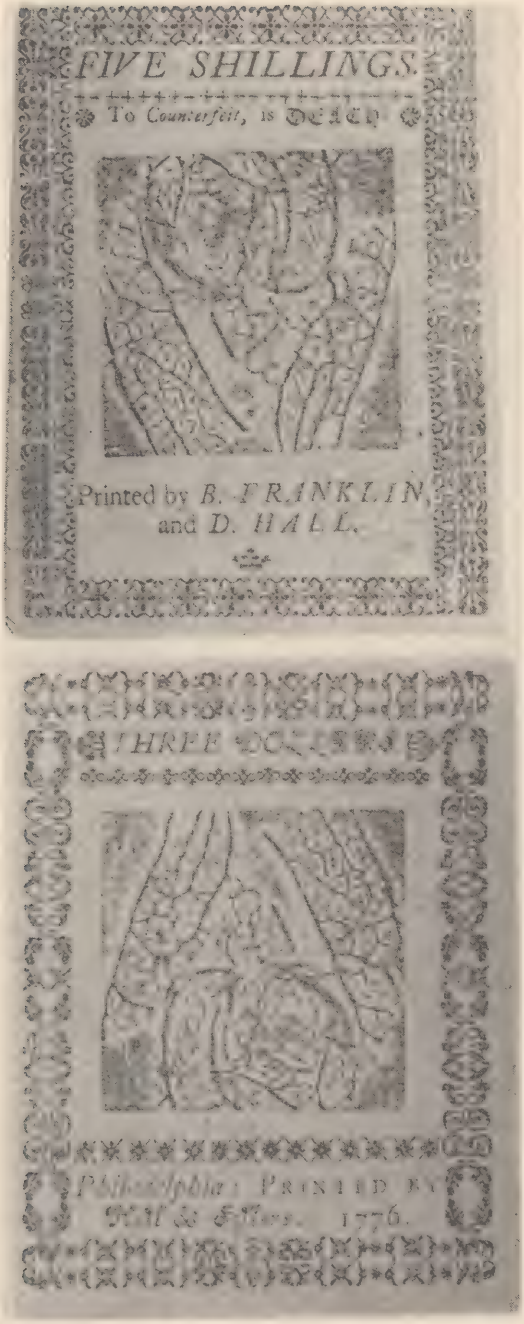


10. Back of 1775 Pennsylvania 30 shilling note with raspberry and filbert leaf cut which was used alternately with 1775-77 Continental Currency $2 notes. (Compare with No. 9)

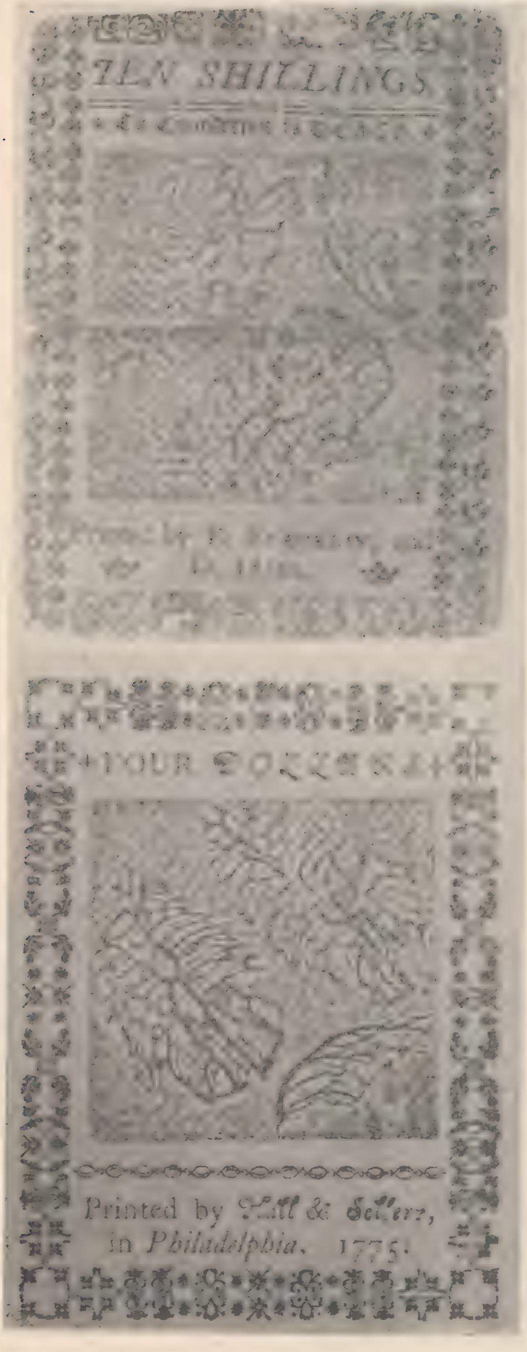
A print consisting of a betony leaf and a sage leaf on a cloth background is found on the 5 dollar Continental Currency notes which are distinctive in that they contain the only leaf prints in that series which bear a denomination. Available Pennsylvania currency cuts of this betony and sage leaf combination could be used only for the 5 dollar Continental denomination because either a V or a VS (5 shillings) had already been engraved into the cuts (Illustration No. 4). Identical cuts with only a V cut into them had been used on the 5 shilling Pennsylvania issues of June 1, 1756; July 1, 1757; May 20, 1758; May 1, 1760; June 18, 1764, and March 10, 1769. For the March 20, 1771 Pennsylvania issue an S had been added to make VS on some of these cuts which were used again for the October 25, 1775 Pennsylvania issue. The first cut used on the 5 dollar Continental note had a missing or damaged area on the right side of its lower edge and appears to have had only a V cut into it (Illustration No. 13). It therefore appears to have been left over from the March 10, 1769 or earlier Pennsylvania issues. This defective cut was used on Continental Currency issues of May 10, 1775; November 29, 1775; February 17, 1776; May 9, 1776, and was then discarded. Another cut of the identical leaf and cloth design but with VS engraved into it was substituted on 5 dollar Continental notes for the issues of July 22, 1776; November 2, 1776; February 26, 1777, and May 20, 1777, creating the unusual situation of a 5 dollar denomination of four consecutive issues of Continental Currency bearing a 5 shilling insignia (Illustration No. 13).

Another casting from the same mold was used on the £6 Pennsylvania note dated June 15, 1767, with an LVI engraved into it as a denomination (Illustration No. 14).

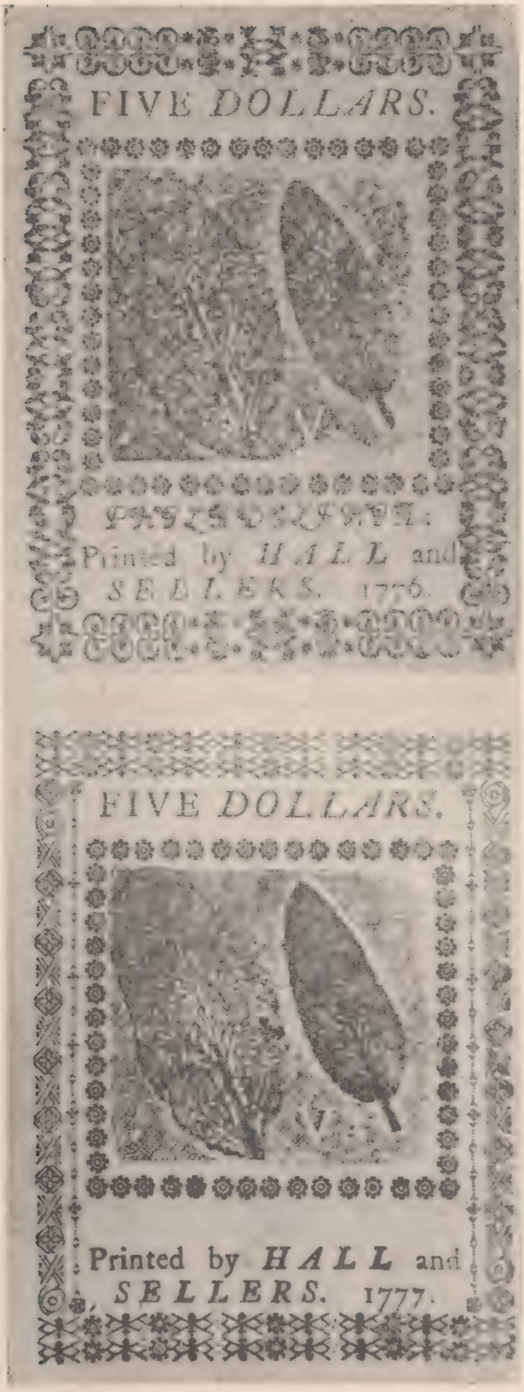
Still another casting from the same leaf mold had been converted for use



11. Identical nature prints on back of 1755 Pennsylvania 5 shilling note and upside down on back of 1775-77 Continental Currency $3 notes.



12. Identical nature prints on back of 1755 Pennsylvania 10 shilling note and upside down on back of 1775-7 Continental Currency 4 dollar notes.


FIVE DOLLARS.
Printed by HALL and SELLERS. 1776.
FIVE DOLLARS.
Printed by HALL and SELLERS. 1777.

13. Nature prints on backs of 1775-76 and 1777 Continental Currency 5 dollar issues showing obliterations of S from VS to convert 5 shilling insignia for use on $5 notes. (Compare with Nos. 4 and 14)

in the 30 shilling Pennsylvania issues of March 1, 1769; December 8, 1775, and April 25, 1776, by engraving XXXS, representing 30 shillings, into the cut.

From the foregoing it is clear that numerous cuts were cast from the negative of this particular betony and sage leaf combination. Two were necessary for the issues up to June 18, 1764, each with V. One was converted for the June 15, 1767, issue. Three more were used on the 30 shilling issue of March 1, 1769, and engraved with XXXS. Four (with obverse plate letters A, B, C and D) were used on the 5 shilling issue of March 10, 1769, each engraved with a V, but one of these could have been carried over from the June 18, 1764 issue. Those with the V could have been altered into the VS type used in Pennsylvania and Continental issues. Therefore it seems that there were at least eight identical leaf cuts cast from one original negative.

A cut with a large and a small buttercup leaf, and with a henbit involucral leaf in the upper left, as formerly used on the Pennsylvania 50 shillings issues of April 25, 1759, June 21, 1759, and May 1, 1760, was selected for the $8 Continental Currency issue (Illustration No. 15).

No evidence has been located that the leaf cuts for the $1, $6 and $7 Continental notes were used previously on other currency. These cuts are not too clearly printed when compared with others. It seems possible that some poorer quality cuts which never had been used were found in reserve at Hall & Sellers. A summary of the leaf cuts on the first issues of Continental Currency seems to be as follows:

$1 ragweed and two willows.

$2 raspberry and two filberts.

$3 skeletonized sections of elm leaves and maple fruit.

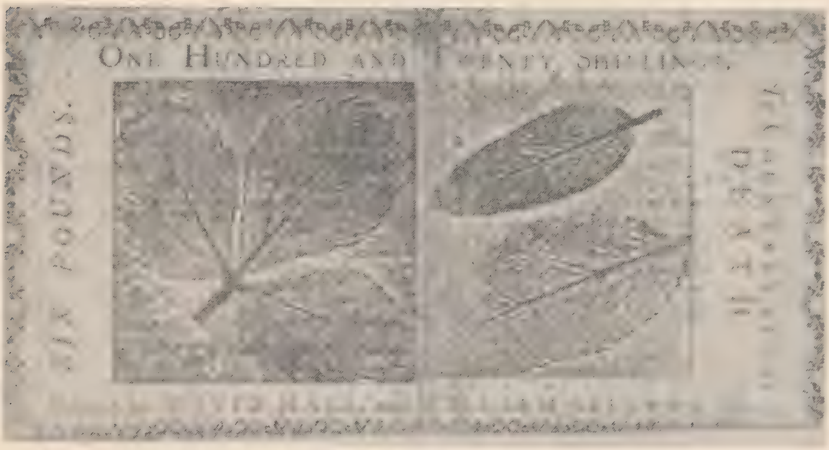
$4 skeletonized maple fruits.

$5 betony and sage.

$6 buttercup (stem points to base of cut).

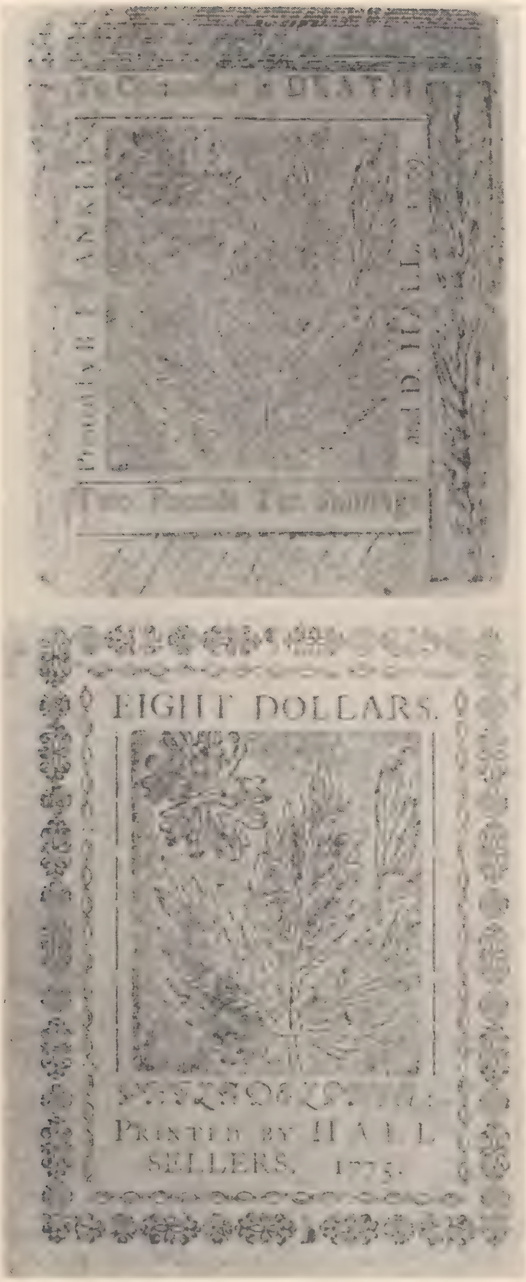
$7 buttercup (stem points to corner of cut).

$8 henbit and two buttercups.



14. **Two nature prints on back of 1767 Pennsylvania 6 pound note (Compare with Nos. 4, 13 and 20).**

When the leaf cuts on the earlier issues of Continental Currency wore out, new nature print cuts were made for each denomination of the April 11, 1778, Yorktown issue of Continental Currency. They contained hand engraved borders fitting snugly on all four sides of the leaf. These cuts were re-used in those denominations which were continued in the September 26, 1778, issue, but the Congress authorized new cuts for the new $50 and $60 denominations. The two new cuts for the reverse of the new denominations were a combination of a cast textile background on each note with what appear to be hand engraved arrows on the $50 and a hand engraved bow featured on the $60 note. The enabling resolution uses the word "cuts" to refer to the entire face of the notes in



15. Identical nature prints on back of 1759-60 Pennsylvania 50 shilling notes and of 1775-7 Continental Currency 8 dollar notes.

stating "That two new cuts be used in striking said bills, one of the denomination of sixty, the other of fifty dollars, in place of the four and six dollar cuts of the former emissions."[16]

The identification of the nature prints on the 1778 issues seems to be as follows:

$4, buttercup (upright).
$5, two willows (crossed).
$6, sage.
$7, grape and sage.
$8, three sage (parallel).
$20, buttercup (diagonal).
$30, three willows (parallel, but two are trimmed).
$40, carrot.

Sage and willow leaves sometimes are so similar that their distinctions cannot be readily determined, because of the quality of the leaf prints.

All sixteen denominations of the final Continental Currency issue of January 14, 1779, were protected with a newly prepared set of cast leaf and cloth cuts. Their identification seems to be as follows:

$1, tansy.
$2, mulberry (diagonal).
$3, rose.
$4, mulberry (vertical).
$5, feverfew.
$20, grape.
$30, climbing fumitory.
$35, two willows.
$40, poterium.
$45, ground ivy.
$50, two parsley sprigs.
$55, willow and fragment.
$60, willow and poison hemlock.
$65, parsley.
$70, maple.
$80, strawberry.

Thus several cuts prepared by Franklin when he was a printer were used by the Continental Congress through the May 20, 1777, issue, and the process he developed was applied to all denominations of all subsequent Continental Currency issues.

The delay in realizing that leaf images on currency were reproduced from nature rather than by hand engraving was due to lack of accurate knowledge concerning printing methods on the part of writers commenting on the Continental Currency. The Continental Congress, on June 23, 1775, ordered its committee "to get proper plates engraved," thus giving a false impression that type and cuts were not authorized. In 1834, when William Dunlap stated that Smithers "engraved the blocks for the Continental money," he left the erroneous impression that the leaf cuts were engraved. In 1851 and 1881, Benson J. Lossing stated "the plates were engraved on copper by Paul Revere," and curiously, in 1862, that the ornamental portions were "engraved on type metal" by Smithers. In 1866 Henry Phillips stated that an original copper plate was still in existence. In 1891 Goss stated "the plates were engraved by Paul Revere" and in 1901 W. L. Andrews repeated that error. In 1899 Paul Ford said "Franklin sketched the cuts" for Continental Currency. In 1944 Lawrence D. Smith stated that Continental Currency was "exclusively printed from copper" and in 1954 Clarence S. Brigham refers to the "engraving of the Continental bills." In 1956 and 1962, Richard T. Hoober mentions "Copper for the plates" and in 1960 L. Miles Raisig refers to "copper plates for currency."[17]

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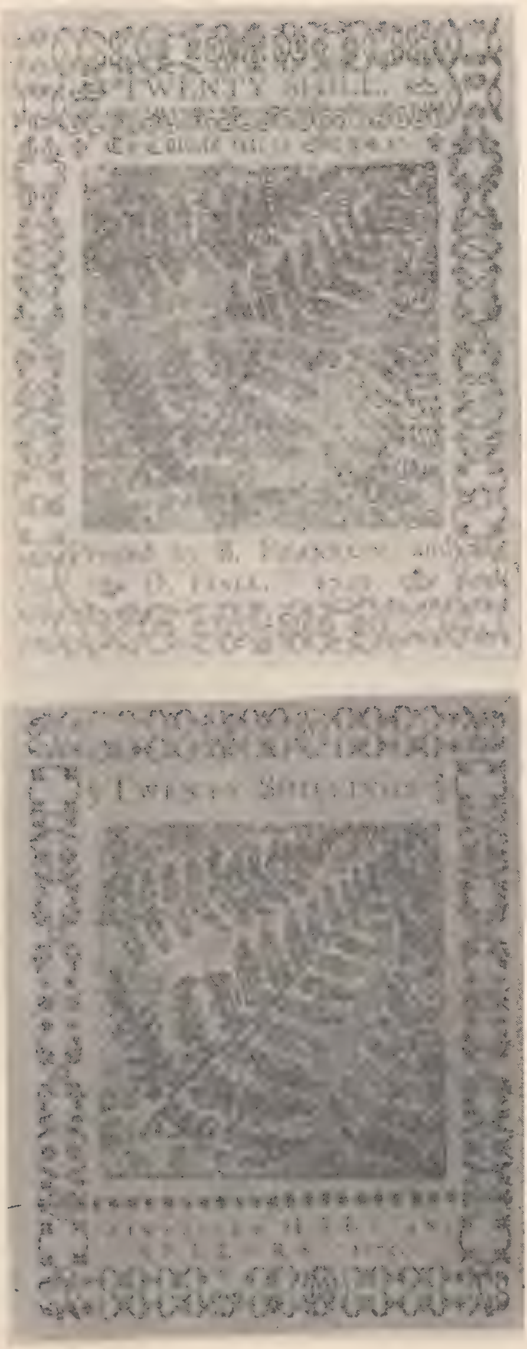
[16] *Journals* of the Continental Congress, Minutes of September 26, 1778.

[17] William Dunlop, *History of the Rise and Progress of the Arts of Design in the United States* (New York, 1834), Vol. 1, p. 156; Benson J. Lossing, *Pictorial Field Book of the Revolution* (New York, 1851), Vol. I, p. 317; Benson J. Lossing, "Continental Money," *Harper's Monthly Magazine,* (March, 1863), Vol. 26, p. 436; Benson J. Lossing, Cyclopedia of United States History (New York, 1881), Vol. 1, p. 320; Henry Phillips, *Historical Sketches of the Paper Currency of the American Colonies, Prior to the Adoption of the Federal Constitution*, Second Series (Roxbury, Mass., 1866), p. 202; Elbridge H. Goss, *Life of Paul Revere* (Boston, 1891), Vol. 2, p. 424; William L. Andrews, *Paul Revere and His Engravings* (New York, 1901), p. 19; Paul L. Ford, *The Many Sided Franklin* (New York, 1899), p. 324; Lawrence D. Smith *Counterfeiting, Crime Against the People* (New York, 1944), p. 66; Clarence S. Brigham, *Paul Revere's Engravings* (Worcester, Mass., 1954), p. 161; Richard T. Hoober, op. cit., *The Numismatist,* p. 1361 and *Coin World,* January 5, 1962, p. 41; L. Miles Raisig, "The Continental Currency Makers," *The Numismatic Scrapbook Magazine,* Vol. 26, No. 10 (Oct., 1960), p. 2828.



16. Identical fern nature prints on backs of 20 shilling notes of Pennsylvania showing XX on 1757 issue modified to XX over S on 1775 issue.

Kenneth Scott and the author in 1957 and thereafter[18] stressed the fact that Continental Currency was printed from type and cuts and not from copper plates but the author had no inkling that the leaf cuts had not originated from hand engraving.

The nature prints on the reverse of the Continental Currency add to the evidence that any copper plates for Continental Currency are plates for counterfeits and not for genuine bills. These nature prints conclusively show that the elements assembled in the form to print the Continental Currency were cast type, cast ornaments, castings of hand engraved borders, castings of hand engraved circular cuts, and castings of nature prints. No stereotype of the entire note or sheet was used, because on occasion a letter changes position during the printing of an issue.

Pennsylvania

As heretofore pointed out, Franklin began printing Pennsylvania paper money in 1731. The first leaf cuts were introduced on the reverses of all denominations of Pennsylvania currency dated August 10, 1739 (Illustration No. 3). These blackberry and willow leaf prints were identical on each denomination and were re-used on the August 1, 1746, issue. The issues dated August 1, 1744, and May 16, 1749, were of smaller denominations and contained no printing on the reverse. The two highest denominations of the October 1, 1755 issue, being 5 and 10 shillings (Illustrations Nos. 11 and 12) contained new separate leaf prints hereinbefore mentioned, the balance of the issue apparently having blank reverses. Thereafter each denomination of Pennsylvania currency developed a separate leaf print history of its own. The £5, £3, £2, 30 shilling, 10 shilling, and 5 shilling notes have been mentioned in connection with Continental Currency.

A print of three fern pinnules on a cloth background (Illustration No. 16) is found on the reverse of all issues of the 20 shilling notes of Pennsylvania between January 1, 1756, and April 25, 1776, having nature prints. Prior to the June 14, 1764, issue, an XX was engraved into these cuts. In the March 20, 1771 and subsequent issues an S for shillings was added. The S is directly beneath the XX in all combinations with B plate obverses and on the October 25, 1775 issue without any plate letter. The S is at the right of the XX in all combinations with A plate letter obverses. In the June 15, 1767 issue another cut of the same leaf was used on the 80 shilling note with an L and an X straddling the existing XX to form LXXX as the denomination. In the March 1, 1769 issue still another cut of the same leaf was used for a 12 shilling note with an XII engraved into the casting. Examination of these fern nature prints indicates that two separate sets of leaves were used to make the original intaglios, for the leaves on some cuts differ slightly from those on others. This is the only situation found in which an attempt was made to duplicate a nature print with a new set of original leaves.

A print of one pinnule of a fern is found on the reverse of most issues of 15 shilling notes of Pennsylvania from January 1, 1756 through October 25, 1775. Up to March 10, 1759, these contained XV cut into the casting. On that date an S was added to make XVS. The same cut was used in the £2 note of the June 15, 1767 issue with 2 L engraved into the cut.

There was a design of diagonal and vertical stripes (Illustration No. 17), used by Franklin & Hall on the reverse of the 2 shilling 6 pence Pennsylvania issue of January 1, 1756, but an examination by the botanists heretofore named indicates that it was hand-engraved and not a composite design made up from plants. It is the only cut for the reverse of any of Franklin's Pennsylvania notes which is not a nature print. It appeared again on the same denomination in the April 3, 1772, October 25, 1775, and April 25, 1776 issues, these being printed by Hall & Sellers. The identical cut was re-used by John Dunlap on the reverse of the 2 shilling 6 pence Pennsylvania note of April 10, 1781. This was the last Pennsylvania issue employing cuts made by Franklin.

The 2 shilling Pennsylvania issues of January 1, 1756 and June 18, 1764 contain a print of a meadow sage leaf on their reverses. The identical cut was re-used on the £4 note of June 15, 1767, with 80S engraved upon it. A new cut of a strawberry leaflet was used by Hall & Sellers for the 2 shilling notes of the April 3, 1772, October 25, 1775, and April 25, 1776 issues and re-used by John Dunlap for the same denomination in the April 10, 1781 issue.

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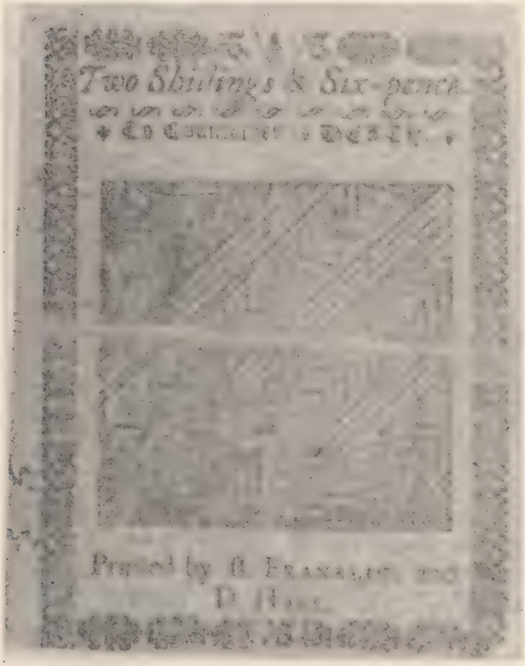
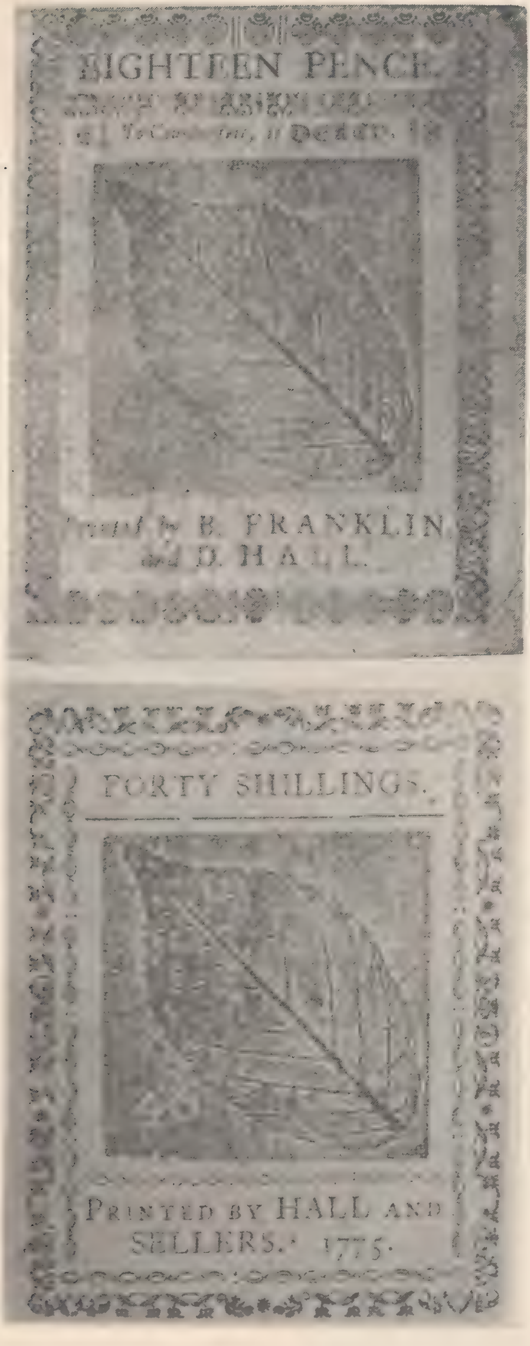
[18] Eric P. Newman, "Counterfeit Continental Currency Goes to War," *The Numismatist,* Vol. 70, No. 1 & 2 (Jan., Feb., 1957), p. 5 et seq., reprinted; Kenneth Scott, *Counterfeiting in Colonial America* (New York, 1957), pp. 139-140; Eric P. Newman "Historic Printing Plate Located," *Coin World,* Dec. 8, 1961, p. 10.

A nature print of an elm leaf was used on the 18 pence notes of Pennsylvania issued January 1, 1756 and June 18, 1764 (Illustration No. 18). It is of particular interest because the warp and woof of the cloth background are both very wavy, indicating that an actual piece of damp cloth was used for reproduction. This cast cut was originally modified by having the denomination 1.6 engraved into it. Two identical cuts of this leaf were converted for use in the 40 shilling notes of April 3, 1772 by altering the 1.6 into a 40 and placing an S above the 40 (Illustration No. 18). These cuts continued in use for the 40 shilling denomination of the July 20, 1775, December 8, 1775, and April 25, 1776 issues. A new and different leaf cut for the 18 pence denomination was introduced. The new leaf print consists of rose leaves and is found on the reverse of the April 3, 1772, October 25, 1775, April 25, 1776, and April 10, 1781 issues (Illustration No. 19).

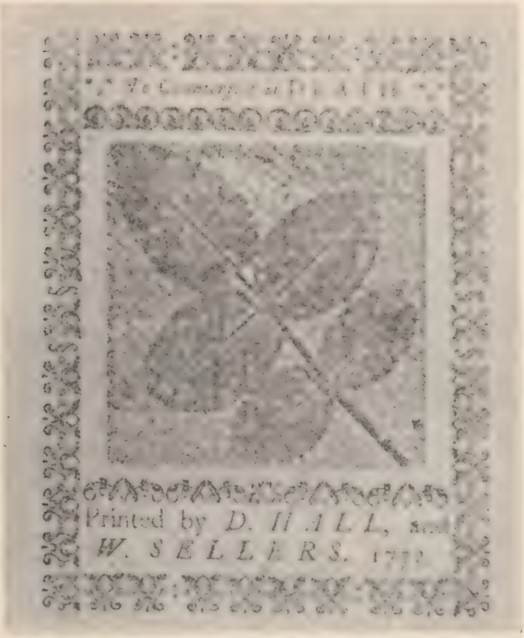
The 1 shilling Pennsylvania issue of June 18, 1764, contains a strawberry leaf on its reverse. The cut then appears on the £6 note of the June 15, 1767, issue with CXX.S engraved upon it (Illustration No. 14). Another identical cut with "one sh" engraved upon it appears on the issues of April 3, 1772, October 25, 1775, and April 25, 1776 (Illustration No. 20).



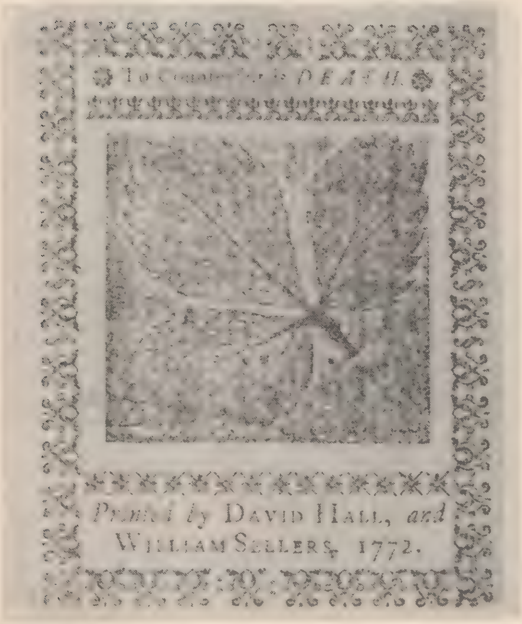
17. 1756 Pennsylvania 2 shilling 6 pence note with imprint of only cut on Pennsylvania currency backs originating from hand engraving during Franklin era.


EIGHTEEN PENCE.
Printed by B. FRANKLIN and D. HALL.
FORTY SHILLINGS.
PRINTED BY HALL AND SELLERS. 1775.

18. Identical leaf and cloth print on back of 1756 Pennsylvania 18 pence and of 1775-76 Pennsylvania 40 shilling with engraved denomination modified.



19. Typical rose leaf print on 1772-81 Pennsylvania 18 pence notes.



20. Typical strawberry leaf print on 1772-76 Pennsylvania 1 shilling notes. (Compare with No. 14)

The reverse of the April 29, 1780, issue of Pennsylvania currency printed by John Dunlap contains a completely new and distinctive set of leaf prints. The following April 20, 1781 issue used the same 1780 leaf prints where the denominations coincided, but where new low denominations were added, three cuts of pre-Revolutionary Pennsylvania prints were re-used as previously stated.

From the foregoing it is clear that many of the Pennsylvania leaf cuts prepared during the Franklin printing era were used intermittently over a span of twenty years or more, the longest period of service being twenty-five years between 1756 and 1781. Since various type fonts which were in constant use in Franklin's printing shop had a life of about ten years,[19] it is not unreasonable that cuts which were used only on occasion could continue to be serviceable for as long as twenty-five years.

The final Pennsylvania issue of 1785, printed by Francis Bailey, has an entirely new set of oblong leaf prints, the leaves on many of which are sheared off at the border of the cut. This, again, indicates that some original negative castings were larger and that the cast cuts were trimmed off to the desired size.

Delaware

Although Franklin had printed Delaware currency since 1729, leaf cuts first appeared on Delaware currency on the February 28, 1746, issue. These cuts were oblong and occupied only a small part of the reverse, the balance of the space being filled with cuts cast from animal engravings, ornamentation, and "Printed by B. Franklin," etc. A different leaf cut and a different animal cut was used on each denomination. These same leaf cuts and animal cuts were re-used on corresponding denominations of the

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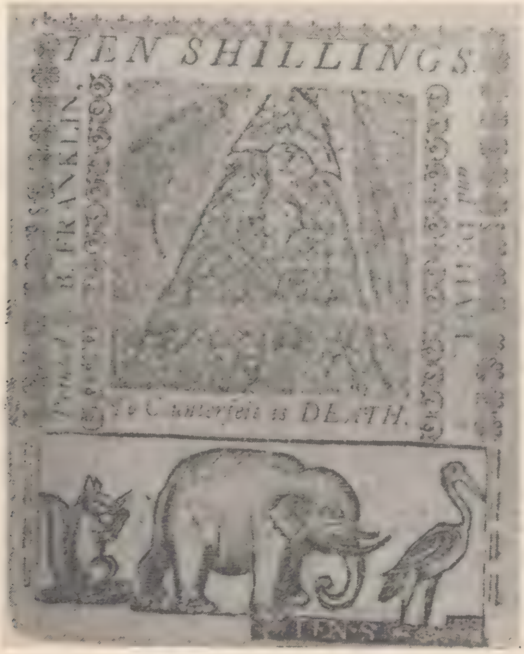
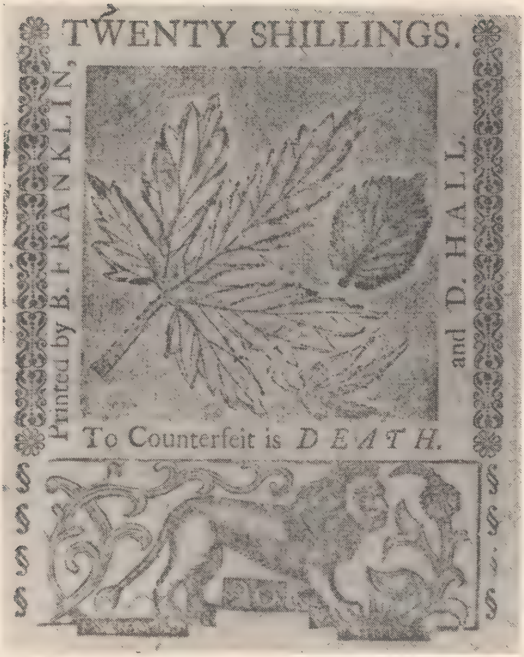
[19] C. William Miller, "Benjamin Franklin's Philadelphia Type," *Studies in Bibliography,* Vol. 11 (Charlottesville, Va., 1958), p. 189.



21. Back of 1759 Delaware 10 shilling note containing both a nature print and engraved animal print. The artist's name "LEECH" can be seen on the right side of the animal print.



22. Back of 1759 Delaware 20 shilling note having imprints originating from nature casts and hand engraved animal cuts.

January 1, 1753, May 1, 1756; March 1, 1758, and May 1, 1758 issues "Printed by B. Franklin and D. Hall" but in the two 1758 issues a new leaf cut was used on the 10 shilling notes and the cut formerly used on the 10 shilling notes was transferred to the 20 shilling notes. The June 1, 1759, notes had a new set of leaf cuts on the reverse, the shape being changed to square, but, again, there was no change in the animal cuts (Illustrations Nos. 21 and 22). The May 31, 1760, issue had another new set of larger leaf cuts, resulting in the elimination of the animal cuts on the reverse.

Benjamin Franklin was in England from July 26, 1757, to November 1, 1762, so there is no doubt that David Hall had been taught the technique of leaf prints. The two complete changes in leaf cuts during this interval were contrary to the practice in Pennsylvania of standardizing one leaf print for each denomination, regardless of issue date, although the Delaware animal cuts remained consistent.

The animal cut for the 10 shilling note contains the engraver's name, "Leech" (Illustration No. 21).

When Delaware currency issues were resumed on January 1, 1776, James Adams had become the printer and no nature prints were used on this series or the final Delaware issue of May 1, 1777.

New Jersey

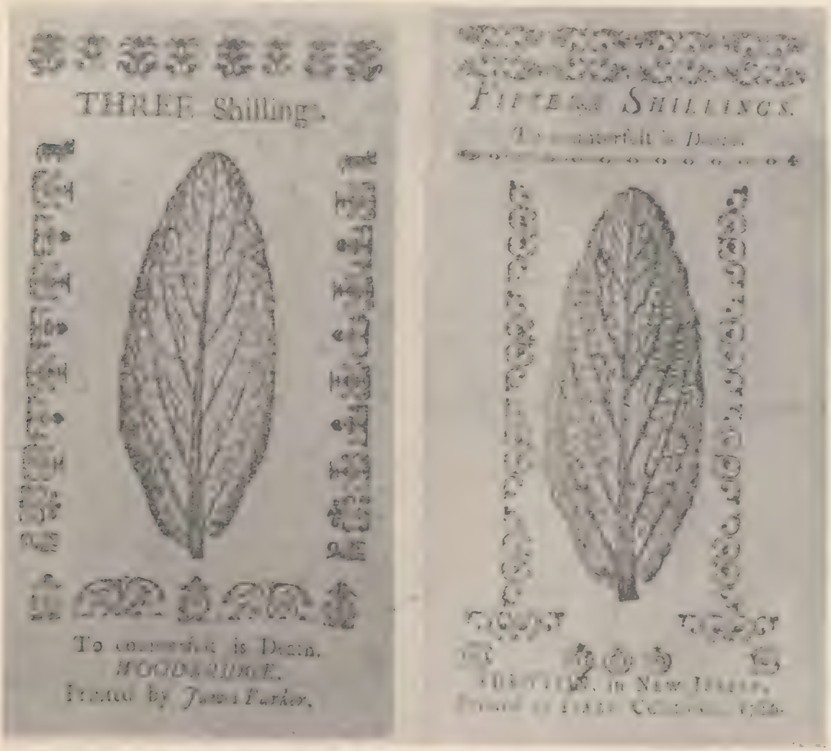
Franklin introduced leaf prints to New Jersey currency with the issue of July 2, 1746, by placing a sage leaf on the reverse of each denomination. Virtually all issues of New Jersey paper currency thereafter had the same sage leaf on the reverse. When James Parker, a former New York printer and friend of Franklin, took over as printer from the May 15, 1755 issue through the April 16, 1764 issue, the sage leaf cuts continued in use. Identical leaf cuts were used on each denomination of an issue (Illustration No. 23).

On the February 20, 1776 issue, when Isaac Collins became printer, an entirely different cut is introduced on the reverse of each note. It likewise is the same on each denomination but is printed as a white on black design. The outline and veins of the leaf appear in white, and the interior of the leaf and the field surrounding the leaf are black. A glance at the leaf shows it is hand-engraved and not nature printed, as the veins improperly overlap each other in some areas and make unnatural curves in others. These cuts were intaglios by virtue of the portions taking ink being background only (Illustration No. 24). Since many were used at the same time, it appears that all these cuts had to be cast from a plaster negative which in turn was cast from a design engraved on copper or other metal, or wood.

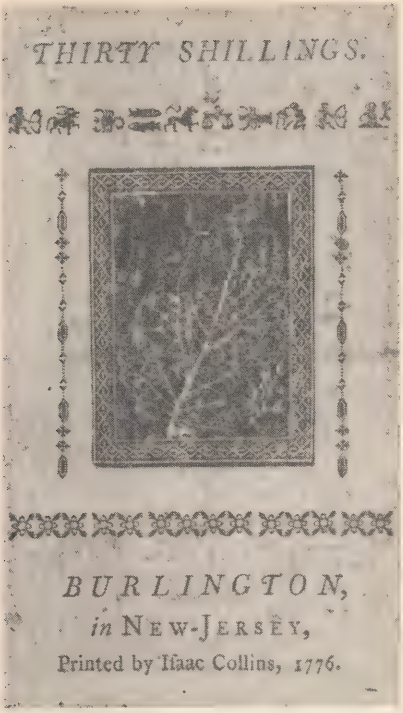
For the issues of March 25, 1776, January 9, 1781, and December 20, 1783, Isaac Collins returned to the identical sage leaf nature prints which his predecessors had used. However, on the back of all notes of the final New Jersey currency issue authorized on May 16, 1786, the nature prints appear unrealistically altered. The area near the perimeter has many unnatural lines, some of which are crisscrossed (Illustration No. 23). Appearing in white along the thick part of the principal vein are what seem to be a reversed slanting S followed by an I C in block letter capitals. Since Isaac Collins was the printer, it is a reasonable guess that the initials represent "Sculpsit Isaac Collins." The man-made lines must have been engraved into the nature cut to strengthen its detail.

These 1786 New Jersey notes appear to be the final use of Franklin's nature printing process anywhere.

The only counterfeit currency containing leaves produced by Franklin's nature printing process seems to have been the 30 shilling Plate B New Jersey notes dated April 16, 1764. The original counterfeits had the misspelling SHILLIGNS on the reverse. Thereafter the spelling was corrected but the corrected counterfeits show a different sage leaf nature print substituted. The nature prints are so superbly done on these counterfeits that it is entirely possible that the leaf cuts could have been surreptitiously



23. Typical back of 1746-1783 New Jersey paper currency with nature print of sage leaf compared with back of 1786 New Jersey issue showing hand engraved lines supplementing nature print and S I C (Sculpsit Isaac Collins) cut on main vein.



24. Back of New Jersey February 20, 1776, note with leaf cut originating from hand engraving.

removed from the possession of James Parker, the official printer. In any event the counterfeits can be distinguished from the genuine notes by the coat-of-arms, the border designs, the half sun ornament, etc. on the front and by differences in the type size, the ornament position, the omission of the period after DEATH, etc., on the back. The six different plate letter varieties of genuine 30 shilling notes of the April 16, 1764, issue all have arms, borders, and ornaments cast from identical hand engraved molds. There is also a crude counterfeit of Plate G of the New Jersey 30 shilling note of April 16, 1764, but the leaf design on the back is hand engraved and not nature printed.

Maryland Nature Prints

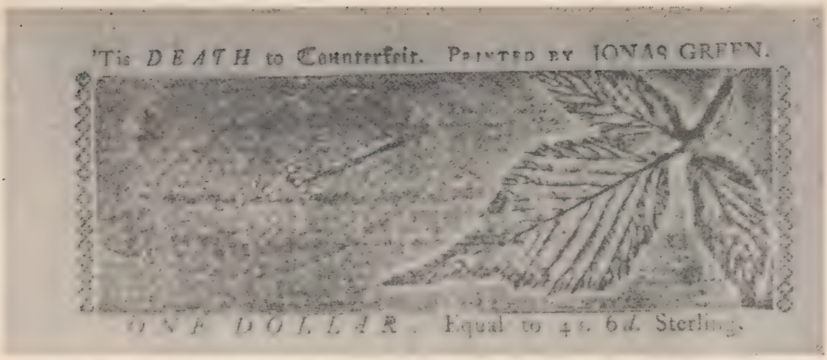
From 1733 through the issue of April 6, 1751, Maryland paper currency was printed from one set of copper plates engraved in England, five notes of the same denomination being on each plate. The backs were blank and the final half of the date was filled in by hand.

For the July 14, 1756 issue, the advantage of using type, ornamentation, cuts, and nature prints of leaves was recognized as a better protection against counterfeiting. Pennsylvania, New Jersey, and Delaware had adopted such practices. Jonas Green, the printer, combined many elements in printing the front of each note in relief. The cuts consisted of the Maryland coat of arms, decorative strips on the indentured left end, and border strips, some being wood blocks and some being type metal castings made from intricate hand engraved intaglios. The back had different nature prints on each known denomination.

The next issue, authorized by Maryland in 1767, consisted of dollar denominations and their fractions, instead of Maryland shillings and pence as in the past. Other than the coat of arms, new cuts were made for the front of these bills of credit. These contain the name or initials of the artist, T. Sparrow, sculp't, T.S. or Thomas Sparrow. In some of the bills the printer's name is included in the cuts and in type as J. G. Printer, I. G. Printer, J. Green or I. G. the I being the Latinized abbreviation for Jonas.

On the back of the bills, the cuts of nature printed leaf and cloth designs used in 1756 were re-used (Illustration No. 25). There are eight different leaf prints on the back of the eleven denominations, a carrot and sage leaf cut formerly on the 1 shilling of 1756 being used for the $1/3 and $4, a cherry and blackberry leaf cut for the $1 and $6, and a dill and blackberry leaf cut formerly on the 18 pence of 1756 being used for the $2 and $8. The cut on the 5 shilling was used on the $2/9, and the cut on the 20 shilling on the $2/3.

Of these eight nature designs there is an I G in white appearing within five of these prints. These initials of Jonas Green on four prints are punched in dotted form into the cut itself rather than into the intaglio from which the cut was cast (Illustration No. 25). The fifth cut has the initials incised in solid letters. Jonas Green apparently was quite proud of his nature printing and put his initials on his work to indicate his artistry. He obviously learned the technique from Franklin, who was his friend and who authorized him to print some issues of *Poor Richard's Almanac.*


'Tis DEATH to Counterfeit. Printed by JONAS GREEN.
ONE DOLLAR. Equal to 4s. 6d. Sterling.

25. Typical nature print on back of 1756-1774 Maryland notes showing Jonas Green's initials I. G. punched into cast cut.

When the 1770 Maryland bills of credit were printed by A.C. and W. Green as successors to Jonas Green, the identical cuts were re-used on the fronts and the identical nature print cuts were re-used on the backs of corresponding denominations. Similarly, in the 1774 issues, the same cuts were used on the same denominations, the name of the printing firm having become Anne Catherine and F. Green.

The nature print used on the $2/3 of the 1770 and 1774 issues is upside down when compared with its position on the 1767 issue. This merely corroborates that the leaf cut was separate from the type surrounding it.

The identification of the nature prints on the 1756, 1767, 1770, and 1774 issues appears to be as follows:

$1/9, common yarrow.

6d & $1/6, pinnae of ferns.

5 sh & $2/9, hops and blackberry.

1 sh, $1/3 & $4, carrot and sage.

$1/2, pear and unidentified leaf.

20 sh & $2/3, involucre of dill or carrot.

$1 & $6, cherry or apple, and blackberry.

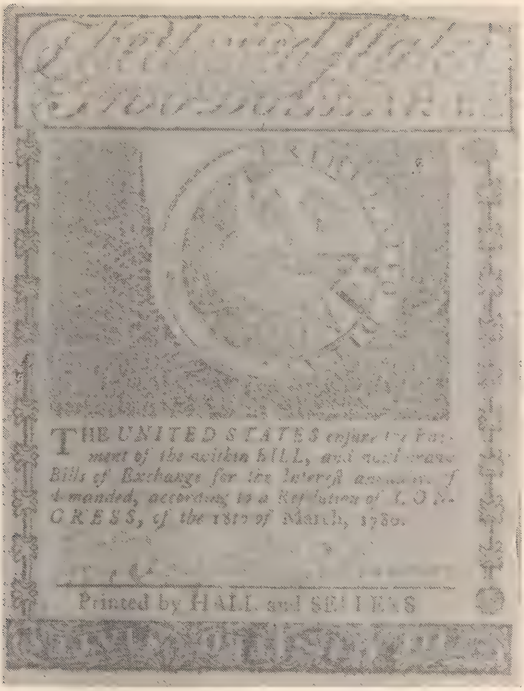
18d, $2 & $8, dill and blackberry.

None of the issues of Maryland paper money after 1774 contains nature prints.

The Guaranteed Issues

By resolution of March 18, 1780, the Continental Congress authorized the United States to guarantee the payment of a new series of notes to be issued by each state. One group containing circular insignia of the type first used on Continental Currency in 1775 was issued by the states of New Hampshire, Massachusetts, Rhode Island, New York, New Jersey, and Maryland. The second group containing circular insignia of the higher denominations of the 1779 Continental Currency was issued by Pennsylvania and Virginia. All were printed in red and black by Hall & Sellers in Philadelphia. They contain various floral and leaf designs surrounding the circular insignia on the reverse of the $2, $4, $5, and $7 denominations issued by the first group and on the reverses of all denominations of the second group. These leaf designs are so crude in artistic quality as to indicate conclusively that they were the result of hand engraving and not reproductions from nature. It is evident that intaglio cuts were used because the perimeter, veins, and stems of the leaves are in white (Illustration No. 26).

On the reverses of the $1 and $2 denominations of the first group and on the reverses of the $4 denomination of the second group appear unnatural white spaces adjacent to the circular vignette. It is evident that these are areas where the cut broke off when the hole for the circular vignette was drilled or cut out (Illustration No. 26). On the other denominations the holes were made in the cut without difficulty. This shows that the cut for the circular vignette was prepared separately and inserted into the rectangular cut for the back of the note.


THE UNITED STATES ensure the Payment of the within BILL, and will draw Bills of Exchange for the Interest annually if demanded, according to a Resolution of CONGRESS, of the 18th of March, 1780.
Printed by HALL and SELLERS

26. Typical back of 1780 state $2 note guaranteed by United States with broken cut of hand engraved leaf design.

Re-invention of Nature Printing

When the process of electroplating was discovered in 1837 by Moritz Jacobi in St. Petersburg, the dawn of electrotyping was at hand. It then became possible to use a soft or weak material in making a negative mold of an object, which mold could be plated with metal. In 1854, Alois Auer of Vienna undertook to obtain a putty or prepared lead impression of a botanical specimen and to copper plate the impression. The concave side of the copper plating then was filled with metal and the convex surface used to emboss the detail on a lead sheet for printing. In this way he produced plates for a botanical book. Believing his idea was new he took credit for "The Discovery of the Natural Printing Process."[20] When Henry Bradbury's book entitled "Nature Printing and its Origin and Objects" was published in London in 1856, the credit was given to Auer for the first nature printing from plates. The many books on botany and on botanical illustrations do not mention Franklin's idea or the American paper money leaf prints which preceded Auer's discovery by more than a century. In a search of books on printing techniques for a mention of this phase of Franklin's accomplishment in that field, nothing was found.

Conclusion

Thus it appears that Franklin and the currency printers of early America, with whom Franklin shared his knowledge, kept his invention a secret in spite of the fact that the product of their work was widely circulated from its issuance and widely collected since its demonetization. The ingenuity of the mind of Franklin to invent a process which was clever enough to be seen but not to be recognized for 226 years[4] bespeaks of his genius. In the history of printing, Franklin turned over a "new leaf" if you, gentle reader, will pardon a pun in that "vein."

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[4] Exhibition at Philadelphia Museum of Art from May 2 to June 9, 1963, *A World of Flowers: Paintings and Prints,* Philadelphia Museum of Art Bulletin, Vol. LVIII, No. 277 (Spring, 1963), pp. 236-242.

[20] Alois Auer, *Die Entdeckung des Naturselbstdruckes* (Vienna, 1854).